Last Word on Point: Skeletal muscle mechanical efficiency does increase with age

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TO THE EDITOR: We greatly appreciate the interest of the readers with age Last Word on Point: Skeletal muscle mechanical efficiency does increase with age. Furthermore, we also wish to respond to their comments on this topic.

First, reinforced by the readers’ comments on this Point:Counterpoint, the recognized effect of aging on the shift toward an aerobic muscle phenotype and consequently the potential for an increase in mechanical efficiency is a complex phenomenon. Indeed, other age-related factors such as reduced muscle elasticity, hysteresis of human tendons, and comorbidities are potential factors that independently or in combination can affect exercise capacity and consequently influence skeletal muscle mechanical efficiency. Additionally, it should also be noted that, independent of age, limited mobility results in the atrophy of the skeletal muscles of the lower limbs and an associated shift to a less-efficient, more fatigable, glycolytic fiber phenotype. Therefore future studies need to address the clearly different effects of aging and disuse on skeletal muscle mechanical efficiency to facilitate a more complete understanding of this topic.

Second, our argument that healthy aging is associated with increased mechanical efficiency is not only based on a recent study of leg cycling in centenarians (6), but also founded on other studies focused more specifically on skeletal muscle function. For example, using phosphorus magnetic resonance spectroscopy and electrically elicited contractions, Tevald et al. (3) demonstrated that following 5 min of constant exercise, the metabolic cost of twitch contractions was 27% lower in older muscle than in young muscle. Therefore, also during a steady-state electrically induced exercise, the efficiency of skeletal muscle is significantly increased in older subjects. Moreover, Lawrenson et al. (1) revealed that during in vivo isolated small muscle exercise, quadriceps muscle VO2, calculated using the direct Fick method, tended (especially at the lower work rates) to be reduced in a group of older subjects in their 60s compared with their younger counterparts in their 20s. Although this difference was not pronounced, but may potentially increase with subjects of a greater age, the utilization of this experimental approach in which the calculated efficiency can only be attributed to the working muscle, again, clearly supports the conclusion that VO2 was certainly not increased with age.

Finally, in this context, the opportunity to study extraordinarily successful aging, in the form of centenarians, is extremely rare. Perhaps, next time.

DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the authors.

AUTHOR CONTRIBUTIONS
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REFERENCES